Amendments to Claims:

1. (Currently Amended) A component comprising:

a silicon-based substrate; ~~and~~

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and ~~an additive for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5~~ aluminum oxide (Al_2O_3) for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5;

wherein the aluminum oxide (Al_2O_3) concentration is as low as 11 mol% and wherein a presence of CaO is eliminated.

2. (Currently Amended) The component according to Claim 1, wherein the coating includes a mixture of tantalum oxide (Ta_2O_5) and an ~~additive~~ oxide, compound, or precursor chosen from the group consisting of ~~Al,~~ Hf, Si, Ln (rare earth including whole lanthanum series and yttrium) Mg, Mo, Ni, Nb, Sr, and Ti ~~Ti, and Zr~~.

3. (Original) The component according to Claim 2, wherein the coating further includes an additive selected from the group consisting of nitrides, carbides, borides and silicides.

4. (Original) The component according to Claim 1, wherein the substrate is one of a silicon nitride substrate and a silicon carbide substrate.

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11. (Currently Amended) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a ~~thermal~~ protective coating of crystalline composition on an outer surface of the substrate; ~~and~~

the ~~thermal~~ protective coating including a mixture of tantalum oxide (Ta_2O_5) and an additive of at least one of Al_2O_3 and La_2O_3; and

wherein a presence of CaO is eliminated.

12. (Original) The component according to Claim 11, wherein the Al_2O_3 is in the range of about 1-50 mol%.

13. (Currently Amended) The component according to Claim 11, wherein the La_2O_3 ~~is~~ concentration is in the range of about 1-10 mol%.

14. (Currently Amended) The component according to Claim 11, wherein ~~a surface of~~ the coating has needle-shaped $La_2O_3 - Ta_2O_5$ precipitates.

15. (Currently Amended) A method of protecting a silicon nitride (Si_3N_4) or silicon carbide (SiC) substrate against repeated thermal cycles at elevated temperatures, the method comprising:

mixing an additive including an oxide, compound or its precursor chosen from the group consisting of Al, Hf, Si, Ln (rare earth including whole lanthanum series and yttrium) Mg, Mo, Ni, Nb, Sr, and Ti with a quantity of tantalum oxide (Ta_2O_5) powder, wherein a presence of CaO is eliminated;

preheating the mixture; and

applying the heated mixture to the substrate.

16. (Original) The method according to Claim 15, further comprising firing the substrate and applied mixture to form a solidified protective coating on the substrate having a thickness between 0.5 to 10 mil.

17. (Original) The method according to Claim 15, wherein aluminum oxide (Al_2O_3) in the range of about 1-50 mol% is mixed with the Ta_2O_5 powder.

18. (Original) The method according to Claim 15, wherein La_2O_3 in the range of about 1-10 mol% is mixed with the Ta_2O_5.

19. (Original) The method according to Claim 15, wherein the mixture is preheated to a temperature of about 1000°C before applying the mixture to the substrate

20. (Original) The method according to Claim 15, further comprising heating the mixture to a temperature of about 1600°C and then grinding the mixture before applying the mixture to the substrate.

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21. (New) The component according to Claim 1, wherein the coating further includes an additive selected from the group consisting of carbides, borides and silicides.

22. (re-presented – formerly dependent claim 9) A component comprising:

a silicon-based substrate; and

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and La_2O_3 for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5 , the La_2O_3 being in the range of about 1 -10 mol% before application of the coating.

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23. (re-presented – formerly dependent claim 2) The component according to Claim 22, wherein the protective coating includes a mixture of tantalum oxide (Ta_2O_5) and an oxide, compound, or precursor chosen from the

group consisting of Al, Hf, Si, Ln (rare earth including whole lanthanum series and yttrium) Mg, Mo, Ni, Nb, Sr, and Ti.

24. (re-presented – formerly dependent claim 3) The component according to Claim 23, wherein the coating further includes an additive selected from the group consisting of nitrides, carbides, borides and silicides.

25. (re-presented – formerly dependent claim 4) The component according to Claim 22, wherein the silicon-based substrate is one of a silicon nitride substrate and a silicon carbide substrate.

26. (re-presented – formerly dependent claim 5) The component according to Claim 22, wherein the additive includes aluminum oxide (Al_2O_3).

27. (re-presented – formerly dependent claim 6) The component according to Claim 26, wherein the aluminum oxide is in the range of about 1-50 mol% before application of the coating.

28. (re-presented – formerly dependent claim 7) The component according to Claim 26, wherein the aluminum oxide is in the range of about 1-50 mol% after application of the coating.

29. (re-presented – formerly dependent claim 13) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a protective coating of crystalline composition on an outer surface of the substrate; and

the protective coating including a mixture of tantalum oxide (Ta_2O_5) and La_2O_3;

wherein the La_2O_3 concentration is in the range of about 1-10 mol%.

30. (re-presented – formerly dependent claim 12) The component in claim 29, wherein the coating further comprises Al_2O_3 in the range of 1-11 mol%.

31. (re-presented – formerly dependent claim 14) The component in claim 29, wherein the protective coating has needle-shaped La_2O_3-Ta_2O_3 precipitates.

32. (re-presented – formerly dependent claim 14) A component, comprising:

a substrate formed of silicon nitride or silicon carbide; and

a thermal protective coating of crystalline composition on an outer surface of the substrate; and

the thermal protective coating including a mixture of tantalum oxide (Ta_2O_5) and an additive of at least one of Al_2O_3 and La_2O_3; and

wherein a surface of the thermal protective coating has needle-shaped La_2O_3- Ta_2O_5 precipitates.

33. (re-presented – formerly dependent claim 18) A method of protecting a silicon nitride (Si_3N_4) or silicon carbide (SiC) substrate against repeated thermal cycles at elevated temperatures, the method comprising:

mixing an additive including an oxide, compound or its precursor chosen from the group consisting of Al, Hf, Si, Ln (rare earth including whole lanthanum series and yttrium) Mg, Mo, Ni, Nb, Sr, Ti, and Zr with a quantity of tantalum oxide (Ta_2O_5) powder;

wherein La_2O_3 in the range of about 1-10mol% is mixed with the tantalum oxide (Ta_2O_5) powder;

preheating the mixture; and

applying the heated mixture to the substrate.

34. (re-presented – formerly dependent claim 10) A component comprising:

a silicon-based substrate;

a protective coating for the substrate, the protective coating including tantalum oxide (Ta_2O_5) and an additive for suppressing transformation from beta Ta_2O_5 to alpha Ta_2O_5;

wherein the additive includes La_2O_3 in a concentration in the range of about 1-10 mol% after application of the coating.

35. (New) A method of protecting a silicon nitride (Si_3N_4) or silicon carbide (SiC) substrate against repeated thermal cycles at elevated temperatures, the method comprising:

mixing La_2O_3 with a quantity of tantalum oxide (Ta_2O_5) powder;

preheating the mixture; and

applying the heated mixture to the substrate;

wherein the La_2O_3 concentration before applying the heated mixture to the substrate is in the range of about 1-10 mol%.

36. (New) A method of applying a protective coating onto a silicon-based substrate, the method comprising:

mixing Ta_2O_5 powder with Al_2O_3 powder to create a ceramic mixture;

roughening the silicon-based substrate surface;

degreasing the silicon-based substrate surface;

preheating the silicon-based substrate to about 1000°C;

applying the ceramic mixture onto the silicon-based substrate surface with an air-plasma spraying process;

melting the ceramic mixture;

quenching the silicon-based substrate; and

solidifying the ceramic mixture into a protective coating.

37. (New) The method of claim 36, wherein the silicon-based substrate comprises silicon nitride (Si_3N_4).

38. (New) The method of claim 36, wherein the silicon-based substrate comprises silicon carbide (SiC).

39. (New) The method of claim 36, wherein the protective coating thickness is in the range of about 50 microns to about 250 microns.

40. (New) The method of claim 36, wherein the Al_2O_3 concentration is in the range of about 1 mol% to about 25 mol% before applying the ceramic mixture onto the silicon-based substrate.

41. (New) A method of applying a protective coating onto a silicon-based substrate, the method comprising:

mixing Ta_2O_5 powder with La_2O_3 powder to create a ceramic mixture;

roughening the silicon-based substrate surface;

degreasing the silicon-based substrate surface;

preheating the silicon-based substrate to about 1000°C;

applying the ceramic mixture onto the silicon-based substrate surface with an air-plasma spraying process;

melting the ceramic mixture;

quenching the silicon-based substrate; and

solidifying the ceramic mixture into a protective coating.

42. (New) The method of claim 41, wherein the silicon-based substrate comprises silicon nitride (Si_3N_4).

43. (New) The method of claim 41, wherein the silicon-substrate comprises silicon carbide (SiC).

44. (New) The method of claim 41, wherein the protective coating thickness is in the range of about 50 microns to about 250 microns.

45. (New) The method of claim 41, wherein the La_2O_3 concentration is in the range of about 3 mol% to about 10 mol% before applying the ceramic mixture onto the silicon-based substrate.